

4.14

Properties of Logarithmic Functions

Name _____ Date _____ Period _____

Assuming x and y are positive, use properties of logarithms to write the expression as a sum or difference of logarithms or multiples of logarithms.

1. $\ln 4x$

2. $\ln 27y$

3. $\log \frac{5}{y}$

4. $\log \frac{6}{x}$

5. $\log y^4$

6. $\log_3 x^{-2}$

7. $\log x^2 y^3$

8. $\log x^3 y$

9. $\ln \frac{x^3}{y^2}$

10. $\log 10000x^3$

11. $\log \sqrt[4]{\frac{y}{x}}$

12. $\ln \frac{\sqrt[3]{y}}{\sqrt[3]{x}}$

Assuming x , y and z are positive, use properties of logarithms to write the expression as a single logarithm.

13. $\log x + \log z$

14. $\log y + \log 7$

15. $\ln x - \ln 5$

16. $\ln y - \ln x$

17. $\frac{1}{2} \ln y$

18. $\frac{1}{4} \ln z$

19. $3 \ln z + 2 \ln x$

20. $2 \log x - \log y$

21. $3 \log (xy) - 2 \log (yz)$

22. $2 \ln (x^2 y) + 3 \ln (yz^3)$

Use the change-of-base formula and your calculator to evaluate the logarithm. Show work!

23. $\log_3 5$

24. $\log_4 18$

25. $\log_6 159$

26. $\log_{13} 236$

27. $\log_{0.5} 15$

28. $\log_{0.2} 34$

Write the expression using only natural logarithms.

29. $\log_4 x$

30. $\log_8 x$

31. $\log_3 (x + y)$

32. $\log_5 (a - b)$

Write the expression using only common logarithms.

33. $\log_3 x$

34. $\log_5 x$

35. $\log_{1/3} (x + y)$

36. $\log_{1/2} (x - y)$

Solve.

37. $4^3 = 8^{x+1}$

38. $3^{7x} = 27^{2x-1}$

39. $125^{x+3} = 25^{3x}$

40. $\left(\frac{1}{4}\right)^2 = 8^{2x-1}$